

C l a i m s

1. Apparatus for condition control of a pipeline (1) incorporating a fluid flow pipe (15) for transport of a fluid, comprising a plurality of ultrasonic transducers (3₁-3_N) arranged in the vicinity of the external surface (100) of the pipe (15), and wherein a characterization of the pipeline, for example a measurement of the wall thickness of the pipelines, may be performed based on emission, receipt and analysis of ultrasonic signals (3₁-3_N),

characterized in that ultrasonic transducers (3₁-3_N) are positioned as a part of at least one tape (2).

2. Apparatus according to claim 1, wherein the transducers (3₁-3_N) are arranged in an array pattern (4).

3. Apparatus according to claim 1, wherein the at least one tape (2) is attached on to the external surface (100) of the pipe (15) by means of a clamping or an attachment means (5).

4. Apparatus according to claim 3, comprising a protective coating (7) for thermal and mechanical protection, the protective coating (7) arranged on the external surface (100) of the pipe (15) also functions as a clamping or an attachment mean (5) or part of a clamping or an attachment means (5) for the tape (2).

5. Apparatus according to claim 1, wherein the tape (2) comprises electrical elements, such as for example electrical/electronic components (8) and conducting tracks (9).

6. Apparatus according to claim 1, wherein the tape (2) comprises a protective layer (10), for example a layer of silicon rubber, for thermal and mechanical protection.

7. Apparatus according to claim 3, comprising a multiplexer (11) for multiplexing signals from the various transducers (3₁-3_N).

8. Apparatus according to claim 3, comprising a digital thermometer (12) for measuring the temperature allowing characterizing to be performed with temperature compensation.

9. Apparatus according to claim 3, comprising a plurality of electronic circuit cards connected together in order to cover a larger part of the circumference of the pipe (15).

10. Apparatus according to claim 1, wherein the tapes (2) cover a critical segment of the pipe (15) circumference.

11. Apparatus according to claim 1 or 2, wherein the transducers (3₁-3_N) are covered by an external protective coating (7) for corrosion protection or insulation.

12. Apparatus according to claim 1, wherein the ultrasonic transducers (3₁-3_N) are connected to an electrical contact mean (30) in order to provide a possibility of connection with external equipment (200, 300).

13. Apparatus according to claim 12, wherein the contact means (30) are placed on the external surface of the protective coating (7), whereby the contact means (30) may be accessible by removal of a part of the protective coating (7) surrounding the contact means.

14. Apparatus according to claim 12, wherein the contact means (30) comprises an electrical cable extending out through the protective coating (7).

15. Apparatus according to claim 12, wherein the contact means (30) comprises an protruding electrical cable terminated close to the external surface of the protective coating (30).

16. Apparatus according to claim 14 or 15, wherein the cable is terminated in a subsea contact.

17. Apparatus according to claim 1, comprising at least two tapes (2) for transducers, the first tape (2A) being arranged on one side of a weld or joint (20) and a second tape (28) being arranged on the other side of said weld or joint (20).

18. Apparatus for condition control of a pipeline (1) with a fluid flow pipe (15) for transport of a fluid, comprising a plurality of ultrasonic transducers which are embedded in and protected by a surrounding polymer material, the polymer material functioning as protection of the exterior surface (100) of the pipe (15), and wherein emission, receipt and analysis of ultrasonic signals by means of transducers (3₁-3_N) are used for characterization of the pipeline, for example a measurement of the thickness of the pipeline, characterized in that the ultrasonic transducers (3₁-3_N) are arranged as an integral part of at least one tape (2) and that the ultrasonic transducers (3₁-3_N) are connected to an external drive, control and signal analysis unit by means of an inductive connection means.

19. System for condition control of a pipeline for transport of a fluid, comprising an ultrasonic apparatus for generation of drive signals for a plurality of ultrasonic transducers emitting ultrasound, an A/D converter which also is connected to the ultrasonic transducers for converting analog signals from the

ultrasonic transducers to digital data corresponding to the analog signals from the ultrasonic transducers and transmitting the digital data to a control and data analysis unit analyzing the received signals, characterized in that a plurality of ultrasonic transducers are arranged as an integral part of one or more tapes, the tapes being permanently attached to the external surface of the pipeline wall and ply to the pipeline surface when clamped, the properties of the pipeline, such as for example possible reduction of pipeline thickness or properties at a weld or a joint, being calculated by means of the digital data and a software module for thickness calculation as a part of the data analysis unit.

20. System according to claim 19, wherein the software module for thickness calculations comprises software for an identification of the reflected acoustic signals in the digital data and calculating the time delay between emitted and reflected acoustic signals.

21. System according to claim 20, wherein the software module for thickness calculations comprises software for identification of the reflected acoustic signals in the digital data and for analyzing the amplitude of the reflected acoustic signals.